

REMARKS

This Amendment is submitted in response to the Non-Final Office Action dated May 20, 2010. Claims 41, 44, 45, 47-63, 66, 67 and 69-86 are pending in the present application. Claims 1-40, 42, 43, 46, 64, 65 and 68 are cancelled. Claims 50-62 and 72-80 are withdrawn from consideration as being drawn to a non-elected invention. The Office Action provisionally rejected Claims 41, 49, 63, 71 on the ground of nonstatutory obviousness-type double patenting, and rejected Claim 63 on the same grounds. Claims 41, 44, 45, 47-49, 63, 66, 67, 69-71 and 81-86 are rejected under 35 U.S.C. §103. Claims 41 and 63 are amended herein. Claims 87 and 88 are newly added and are supported by the examples shown in Table 4-1.

The Commissioner is hereby authorized to charge deposit account 02-1818 for any fees which are due and owing. If such a withdrawal is made, please indicate the Attorney Docket No. 3712174-00491 on the account statement. Applicants respectfully submit that the rejections are improper or have been overcome, as set forth in detail below.

Currently amended independent Claims 41 and 63 recite, in part, an anode mixture layer comprising an anode material having a reaction phase containing: an element capable of generating an intermetallic compound with lithium; carbon; tin; and at least one constituent selected from the group consisting of nickel, copper, iron (Fe), cobalt, manganese, zinc, indium, and silver, wherein a ratio of carbon in the reaction phase ranges from about 10% by weight to about 40% by weight, and wherein a peak of carbon is obtained in a region lower than about 284.5 eV by X-ray photoelectron spectroscopy, and the carbon in the reaction phase exists among the tin and is bonded to form a carbide with a metal element or metalloid element contained in the reaction phase such that the electric charge density of the carbon in the reaction phase is increased by interaction with the metal element or metalloid element. Support for the amendment can be found, for example, on pages 8-9 of the present application.

In one nonlimiting example of the presently claimed invention, carbon in the reaction phase exists among the lithium active element, and is preferably bonded with a metal element or a metalloid element contained in the reaction phase. (See, Specification, paragraph [0034]). When carbon is bonded with a metal element or a metalloid element contained in the reaction phase, the cohesion or the crystallization of the lithium active element along with charge and discharge can be inhibited. (See, Specification, paragraph [0034]). Meanwhile, when carbon is not bonded with other element and only exists among the lithium active element, it is hard to

inhibit cohesion or crystallization of the lithium active element along with charge and discharge. (See, Specification, paragraph [0034]). Bonded energy of inner shell orbital electrons of each element is changed in correlation with negative electric charge densities on an element in primary approximation. (See, Specification, paragraph [0036]). For example, assume that an electric charge density on a given carbon element A is decreased by interaction with an element which exists in the vicinity thereof. (See, Specification, paragraph [0036]). In this case, outer shell electrons such as 2p electron are decreased. (See, Specification, paragraph [0036]). Therefore, 1s electron of the carbon element A becomes more strongly bonded by a shell of the carbon element A. (See, Specification, paragraph [0036]). As above, when the electric charge density on the element is decreased, a peak is shifted to a side wherein bonded energy is higher. (See, Specification, paragraph [0036]). That is, a bonded energy value reflects an electron state (bonding state) of the element. (See, Specification, paragraph [0036]). For example, a peak position of graphite is shown in 284.5 eV in a device in which energy calibration is made so that a peak of 4f orbit of gold atom (Au4f) is obtained in 84.0 eV. (See, Specification, paragraph [0036]). In the case that carbon is bonded with other element, when XPS is conducted to an anode material, a peak of carbon is obtained in the region lower than 284.5 eV. (See, Specification, paragraph [0037]). In this case, compared to an electric charge density of carbon in graphite, the electric charge density is increased by interaction with a neighboring element. (See, Specification, paragraph [0037]). Generally, it is known that only when other element exists in the vicinity of carbon and the electric charge density thereof is increased, that is, only when carbon forms a carbide with other element, a peak is shown in the range lower than 284.5 eV, as also recited in the present claims. (See, Specification, paragraph [0037]).

The Office Action rejected Claims 41, 49, 63, 71, 81, 82, 84 and 85 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,203,944 to Turner et al. ("Turner"). The Turner reference fails to disclose or suggest several features of the presently claimed invention. First, Turner fails to disclose a ratio of carbon in the reaction phase that ranges from about 10% by weight to about 40% by weight, as admitted on page 5 of the Office Action. Moreover, Turner fails to disclose or suggest that the carbon in the reaction phase exists among the tin and is bonded to form a carbide with a metal element or metalloid element contained in the reaction phase such that the electric charge density of the carbon in the reaction phase is increased by interaction with the metal element or metalloid element, as recited in amended Claims 41 and 63.

Therefore, Turner fails to disclose or suggest each of the features of Claims 41, 63 and dependents thereon.

Accordingly, Applicants respectfully request that the 35 U.S.C. §103(a) rejections of Claims 41, 49, 63, 71, 81, 82, 84 and 85 over Turner be withdrawn.

The Office Action rejected Claims 41, 45, 47-49, 63, 67, 69-71, 81, 82, 84 and 85 under 35 U.S.C. §103(a) over U.S. Patent No. 6,495,291 to Kohno et al. ("Kohno") in view of JP 2000-311681 to Kawakami et al. ("Kawakami"). The Office Action admits that Kohno fails to disclose or suggest a reaction phase that contains at least one constituent selected from the group consisting of nickel, copper, iron, cobalt, manganese, zinc, indium, and silver. Moreover, Kohno fails to disclose or suggest that the carbon in the reaction phase exists among the tin and is bonded to form a carbide with a metal element or metalloid element contained in the reaction phase such that the electric charge density of the carbon in the reaction phase is increased by interaction with the metal element or metalloid element, as recited in amended Claims 41 and 63. Therefore, Kohno fails to disclose or suggest each of the features of Claims 41, 63 and dependents thereon. The Office Action relies on the Kawakami reference regarding the use of Mn, Fe, Co, Ni, Cu and Ag, and thus fails to cure the deficiencies of Kohno, even assuming that the references are properly combinable.

Accordingly, Applicants respectfully request that the 35 U.S.C. §103(a) rejections of Claims 41, 45, 47-49, 63, 67, 69-71, 81, 82, 84 and 85 over Kohno and Kawakami be withdrawn.

Claims 44 and 66 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kohno in view of Kawakami, wherein Kawakami is relied on for further disclosing a fourth element of an alloy as element "X." The Office Action cites to roughly twenty different elements (of which In and Zn are included) and suggests that "it would have been obvious ... to try to form an alloy from a finite number of identified alloying elements ... with a reasonable expectation of success such as long life cycle." (See, Office Action, pg. 9). Applicants respectfully disagree with this position where Kawakami has a very large list of possible elements and provides no guidance as to what, if any, added elements are beneficial for long life cycle, high capacity or high energy density. Nevertheless, this additional reliance from Kawakami does not cure the deficiencies as discussed above.

Accordingly, Applicants respectfully request that the 35 U.S.C. §103(a) rejections of Claims 44 and 66 over Kohno and Kawakami be withdrawn.

The Office Action rejected Claims 83 and 86 under 35 U.S.C. §103(a) as being unpatentable over Kohno in view of Kawakami. The Office Action admits that Kohno as modified by Kawakami does not disclose a carbonaceous material capable of inserting and extracting lithium in about an equal ratio with the anode material, and does not rely on additional prior art to cure the deficiencies of same. Nevertheless, Kohno and Kawakami are deficient with respect to the claimed invention as discussed in detail above.

Accordingly, Applicants respectfully request that the 35 U.S.C. §103(a) rejections of Claims 83 and 86 over Kohno and Kawakami be withdrawn.

In the Office Action: Claim 63 is provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1 and 7-8 of U.S. Patent Application No. 11/267,641; Claims 41 and 63 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1-3, 9-11, 18-19 and 26-27 of U.S. Patent Application No. 12/026,594; Claims 41, 49, 63 and 71 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1-2 and 7-8 of U.S. Patent Application No. 11/268,010; and Claims 41 and 63 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting over Claims 1-3 and 10-12 of U.S. Patent Application No. 11/225,540. Applicants respectfully submit that currently amended independent Claims 41 and 63, and dependents thereof, are patentably distinguishable over the cited applications. Moreover, because the rejections are provisional, Applicants will further address any remaining rejections at such time as allowability has been indicated in one of the cases, if the rejections are still relevant at such time.

Accordingly, Applicants respectfully request that the provisional rejections of Claims 41, 49, 63, 71 under obviousness-type double patenting be withdrawn.

The Office Action also rejected Claim 63 under the judicially created doctrine of obviousness-type double patenting over Claims 4, 7, 9 and 10 of U.S. Patent No. 7,718,311. Applicants respectfully traverse this rejection where the filing date of U.S. Patent No. 7,718,311 (i.e., November 3, 2005) is later than the U.S. filing date of the present application (i.e., January 7, 2005). The doctrine of double patenting seeks to prevent the unjustified extension of patent exclusivity beyond the term of a patent. However, because of the earlier filing date of the

present application, it does not appear that there would be any patent term to disclaim by filing a Terminal Disclaimer.

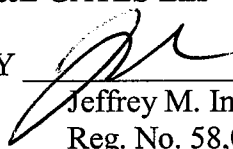
Accordingly, Applicants respectfully request that the rejection of Claims 63 under obviousness-type double patenting over U.S. Patent No. 7,718,311 be withdrawn.

For at least the reasons above, Applicants respectfully submit that the present application is in condition for allowance and earnestly solicit reconsideration of same.

Respectfully submitted,

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